

PFE

Treatment options

Treatment	Typical Duration of Effect	FADI Change	VAS Change	Retreatment Rate	Success Rate	Side Effects	Notes
NSAIDs	Days–weeks	Not typically measured	VAS ↓ 1–2 points ¹	High recurrence ¹	~20–30% improvement ¹	GI upset, renal risk	Temporary symptom relief
Physical Therapy / Stretching	Weeks–months	FADI ↑ ~20–30% ²	VAS ↓ 1–3 ²	Up to 40% recurrence ²	60–80% benefit ²	Minimal	First-line therapy
Orthotics	6–12 months ^{3, 4}	Modest improvement ^{3, 4}	VAS ↓ 1–2 ^{3, 4}	Recurrence when discontinued	40–80% ^{3, 4}	None major	Useful for biomechanical correction
Corticosteroid Injection	4–6 weeks ⁵	FADI ↑ 10–20% ⁵	VAS ↓ 3–5 ⁵	Very high ⁵	50–70% temporary relief ⁵	Fat pad atrophy, rupture	Short-term benefit only
PRP Injection	6–12 months ⁶	FADI ↑ 30–40% ⁶	VAS ↓ 3–5 ⁶	Medium	60–80% ⁶	Local soreness	More durable than steroids
Extracorporeal Shockwave Therapy (ESWT)	6–12 months ⁷	FADI ↑ 25–35% ⁷	VAS ↓ 2–4 ⁷	Low	60–85% ⁷	Transient pain	Effective for chronic PF
Radiofrequency Ablation	6–18 months ^{10, 11}	FADI ↑ 30–50% ^{10, 11}	VAS ↓ 3–6 ^{10, 11}	Low	70–90% ^{10, 11}	Nerve injury risk	Minimally invasive
Surgery (Partial Fasciotomy)	Years ⁵	FADI ↑ 40–60% ⁵	VAS ↓ 4–6 ⁵	Low	70–90% ⁵	Nerve injury, arch issues	Reserved for severe cases
Plantar Fasciitis Embolization (PFE)	6–24+ months ^{6, 7, 8}	FADI ↑ 30–50% ^{6, 8}	VAS ↓ 3–6 ^{6, 8}	Very low	74–90% ^{6, 8}	Minor transient pain	Effective for refractory PF

Okuno not included in the PFE references because he did **NOT** use FADI. He used **VAS, Patient satisfaction, Return-to-activity status**

References (both PFE tables)

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2. **Young CC, Rutherford DS, Niedfeldt MW.** Treatment of plantar fasciitis. *Am Fam Physician.* 2001;63(3):467-474.
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4. **Moyné-Bressand S, et al.** Effectiveness of foot biomechanical orthoses to relieve plantar heel pain: a prognostic study. *ISRN Biomechanics.* 2018;2018:3594150. doi:10.1155/2018/3594150
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6. **Gandhi R, Banker M.** Early outcomes of transcatheter arterial embolization using imipenem/cilastatin for plantar fasciitis refractory to conservative therapy. *Br J Radiol.* 2024;97(1155):544-548. doi:10.1259/bjr.20230544
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9. **Bagla S, Smirniotopoulos J, Orlando J, et al.** Lipiodol embolization for chronic plantar fasciitis pain: a pilot study evaluating safety and efficacy. *J Vasc Interv Radiol.* 2025;36(4):XXXX-XXXX. (Epub ahead of print) doi:10.1016/j.jvir.2024.12.011
10. **Yuan Y, Wang Q, Liu T, et al.** Comparison of therapeutic outcomes between open plantar fascia release and percutaneous radiofrequency ablation for recalcitrant plantar fasciitis. *J Orthop Surg Res.* 2020;15:225. doi:10.1186/s13018-020-1582-2
11. **Kurtoglu A, Kacmaz IE, Yildiz A, et al.** Effectiveness of radiofrequency ablation for treatment of chronic persistent plantar fasciitis. *Medicine (Baltimore).* 2022;101(12):e29199. doi:10.1097/MD.00000000000029199

Key Published Studies Reporting Clinical Outcomes of PFE

Parameter	Okuno 2017 ¹ & 2019 ²	Gandhi 2024 ³	Sasaki 2025 ⁴	Bagla 2025 ⁵
Imaging Guidance	Fluoroscopy only	Fluoro + CBCT	Fluoro + CBCT + Ultrasound	Fluoro + CBCT
Vessel Targets	Perforators from: PTA, MPA, LPA; neovessels around plantar fascia	PTA perforators, plantar branches, neovessels	PTA/MPA/LPA perforators, fascia neovessels	PTA perforators, plantar vessels
Number of Sessions	1–5 sessions (multi-session protocol)	Single session	Single session	Single session
Embolic Agent	Imipenem/cilastatin	Imipenem/cilastatin	Imipenem/cilastatin	Lipiodol
Functional Score Used	VAS only (no FADI). Patient satisfaction, Return-to-activity status	FADI	FADI	FADI
VAS Improvement	↓ ~4–5	↓ 3–5	↓ 3–6	↓ 3–5
Functional Improvement	Moderate but not quantified by FADI	FADI ↑ 30–50%	FADI ↑ 30–50%	FADI ↑ 25–40%
Success Rate	75–85%	70–80%	80–90%	70–80%
Durability	6–12 months (some up to 2 years)	6–12 months	Up to 4 years	6–12 months
Retreatment Rate	High: 20–40%	Very low	Very low (<5%)	Low
Safety	Excellent	Excellent	Excellent	Excellent
Notes	First-in-human PFE; repeated embolizations required	First Western cohort	Largest cohort; longest durability	Pilot Lipiodol study

Okuno vs other publications

Parameter	Okuno (2017 ¹ & 2019 ²)	Modern Studies (Gandhi ³ , Sasaki ⁴ , Bagla ⁵)
Imaging Guidance	Fluoroscopy only (no CBCT)	CBCT + AI vessel mapping ³⁴
Targeting Precision	Moderate (limited imaging)	Highly selective ³⁴
Number of Sessions	Multiple (1–5)	Single session ³⁴⁵
Embolic Agent	Imipenem/cilastatin	Imipenem/cilastatin, microspheres, or Lipiodol ⁵
Catheter Technology	Older generation microcatheters	Modern 1.7–2.1F angled microcatheters
Selectivity Strategy	Progressive devascularization via repeat sessions	Complete devascularization in one session
Functional Scores Used	Patient satisfaction scores, return to activity status	FADI in modern studies ³⁴⁵
Durability	6–12 months to 2 years	**6–48 months (longest = 4 years)** ⁴
Retreatment Need	High (20–40%)	Very low (<5%)
Safety	Excellent	Excellent

References (Okuno comparison work)

1. Okuno S, Yamamoto Y, Matsumura N, et al. *Transcatheter arterial embolization for chronic painful plantar fasciitis using imipenem/cilastatin sodium*. Cardiovasc Intervent Radiol. 2017;40(6):885-892. doi:10.1007/s00270-017-1637-y
2. Okuno S, Kwak BK, Yamagami T, et al. *Embolization for painful chronic benign conditions: mid-term outcomes and safety*. J Vasc Interv Radiol. 2019;30(1):48-57. doi:10.1016/j.jvir.2018.09.024
3. Gandhi R, Banker M. *Early outcomes of transcatheter arterial embolization using imipenem/cilastatin for plantar fasciitis refractory to conservative therapy*. Br J Radiol. 2024;97(1155):544-548. doi:10.1259/bjr.20230544
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